UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,421	03/26/2004	Jin Ki Kim	PAT 980-2	7842

26123 7590 06/09/2006

BORDEN LADNER GERVAIS LLP
WORLD EXCHANGE PLAZA
100 QUEEN STREET SUITE 1100
OTTAWA, ON K1P 1J9
CANADA

EXAMINER	
HUR, JUNG H	

ART UNIT	PAPER NUMBER
2824	

DATE MAILED: 06/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H·A

Office Action Summary	Application No.	Applicant(s)	
	10/809,421	KIM, JIN KI	
	Examiner	Art Unit	
	Jung (John) Hur	2824	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 7-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 7-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 March 2006 has been entered.

Amendment

2. Acknowledgment is made of applicant's Amendment, filed 29 March 2006. The changes and remarks disclosed therein have been considered.

No claims have been cancelled or added by Amendment. Therefore, claims 1-4 and 7-23 remain pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-3, 10, 15 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Lindahl et al. (U.S. Pat. Appl. Pub. No. 2003/0058671).

Regarding claim 1, Lindahl discloses a hybrid content addressable memory array comprising: a first memory portion (one or more leftmost columns of ternary CAM cells in Fig. 3, in light of paragraph [0031], lines 9-17) having a first type (ternary) of content addressable memory cells arranged in rows and columns (a CAM array); a second memory portion (one or more rightmost columns of binary CAM cells in Fig. 3, in light of paragraph [0031], lines 9-17) having a second type (binary) of content addressable memory cells arranged in rows and columns (a CAM array), the second type of content addressable memory cells being electrically coupled to the first type of content addressable memory cells (via 312), each second type (binary) of content addressable memory cell being smaller in size than each first type (ternary) of content addressable memory cell (since binary CAM cells do not need to retain mask information; see paragraph [0031], lines 9-17), the second memory portion being operable simultaneously with the first memory portion (as a CAM array).

Regarding claims 2, 3, 10, 15 and 16, Lindahl further discloses that the first memory portion and the second memory portion include matchlines (312 in Fig. 3), each matchline of the first memory portion being coupled to the first type of content addressable memory cells (the portion of 312 in the ternary columns, in light of paragraph [0031], lines 9-17), and each matchline of the second memory portion being coupled to the second type of content addressable memory cells (the portion of 312 in the binary columns, in light of paragraph [0031], lines 9-17);

wherein the first type of content addressable memory cells include ternary content addressable memory cells and the second type of content addressable memory cells include binary content addressable memory cells (see paragraph [0031], lines 9-17);

wherein the first type of content addressable memory cells and the second type of content addressable memory cells of a row are coupled to a logical matchline (312 in Fig. 3, in light of paragraph [0031], lines 9-17).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 4, 7-9, 14, 17 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindahl et al. (U.S. Pat. Appl. Pub. No. 2003/0058671) in view of Voelkel (U.S. Pat. No. 6,108,227).

Regarding claims 4, 14, 21 and 22, Lindahl discloses a hybrid content addressable memory (CAM) array of claims 1-3, with the exception of the matchlines of the first memory portion and the matchlines of the second memory portion are interleaved with each other, or the first type of CAM cells and the second type of CAM cells of a column are coupled to common searchlines. However, Lindahl suggests other possible CAM configurations of cells and cell types (see paragraph [0031], lines 13-17; see also various match patterns in Tables 1-3 and Figs. 6 and 7 with certain rows with no "don't care" X bits).

Voelkel discloses an arrangement for a hybrid CAM wherein a first type of CAM cells and a second type of CAM cells of a column are coupled to common searchlines, or the

matchlines of the first memory portion and the matchlines of the second memory portion are interleaved with each other (see for example column 7, lines 5-23 in which the ternary and binary types are arranged on a row-by-row basis, resulting in common searchlines and interleaved matchlines).

Since the above teaching of Voelkel and Lindahl implies a desirability of having different CAM cell types on a row-by-row basis, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the memory of Lindahl, such that different rows (or different blocks of rows) have different cell types (depending on the match pattern), resulting in first and second types of cells in a column having common searchlines and interleaved matchlines, since the desirability of such arrangement of different CAM cell types were common and well known in the art (as exemplified in Voelkel and Lindahl).

Further, regarding claims 7, 8, 17 and 23, Lindahl does not disclose that the CAM cells include SRAM based CAM cells. Voelkel discloses an SRAM based CAM cell (see Fig. 7). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to substitute the CAM cells of Lindahl with SRAM based CAM cells, since SRAM based CAM cells were common and well known in the art (as exemplified in Voelkel).

Further, regarding claim 9, Lindahl does not disclose that at least one of the first and the second type of CAM cells include configurable ternary-binary CAM cells. Voelkel discloses configurable ternary-binary CAM cells (Fig. 2, with arrangements in which one or more columns can be switched between modes, or a switching capability can be performed for portions of an

array; see column 7, lines 5-15). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to have at least one of the first and the second type of CAM cells of Lindahl include configurable ternary-binary CAM cells (such as that of Voelkel), for the purpose of increasing the configuration flexibility without increasing the overall CAM size (see for example Voelkel column 4, lines 21-33).

7. Claims 11-13 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindahl et al. (U.S. Pat. Appl. Pub. No. 2003/0058671) in view of Pereira (U.S. Pat. No. 6,191,970).

Lindahl discloses a hybrid content addressable memory (CAM) array as in claims 10 and 15 above, with the exception of the logical matchline including a first matchline segment and a second matchline segment (or at least two matchline segments), wherein the first type of CAM cells are coupled to the first matchline segment and the second type of CAM cells are coupled to the second matchline segment.

Pereira, for example in Fig. 4, discloses a logical matchline (including ML_row) including a first matchline segment (ML_a) and a second matchline segment (ML_b) for a row of CAM cells (CAM CELLs in Fig. 4).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to segment the CAM cells and therefore the row matchline of Lindahl into at least two segments, as in Pereira, such that, as a reasonable arrangement, the ternary portion would be coupled to a first matchline segment and the binary portion would be coupled to a second matchline segment, for the purpose of reducing power consumption associated with

precharging matchlines during compare operations (see for example Pereira, column 1, line 65 through column 2, line 2; note that Lindahl also discloses, for example in paragraph [0032], precharging matchlines).

Response to Arguments

8. Applicant's arguments with respect to claims 1, 15 and 21 have been considered but are moot in view of the new ground(s) of rejection, necessitated by Amendment.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jung (John) Hur whose telephone number is (571) 272-1870. The examiner can normally be reached on M-F 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

6/2/06

Jung (John) H. Hur
Patent Examiner
Art Unit 2824

jhh